process approaches to a grinding surface, with an acute margin at the outer and posterior sides, in the fourth, fifth, and sixth teeth; and it is of a rather round, tuberculous form, in the seventh tooth.

The first molar in the under jaw is placed close to the canine tooth of its side; the second is about $\frac{1}{10}$ht of an inch from the first; the third rather more from the second; and there is another space between the third and fourth of about $\frac{1}{10}$th of an inch: the four last teeth form a continuous row.

The lower canines being received into pits in the intermaxillary bones, is somewhat like an approach to what takes place in some of the Saurian reptiles; and indeed, the whole view of the skull of Thylacynus Cynocephalus reminds the casual observer almost as much of a Saurian as of a Mammiferous animal.

When presented to the Society, the stuffed specimen was, as it is said, in a bad state; and when the present Curator entered upon his office, there was, owing to no care having been taken of it, nothing to be done, but to take out the bones, to preserve them. This, however, was so far fortunate, as it has led to the discovery of the real dental system.

Mr. Grant, who drew up the paper in the "Gleanings in Science," proposed the name of Lycocephalus for this species, apparently not aware that Harris had before named and described it. His mistake as to the number of teeth arose from not having been able to open the mouth far enough to allow him to examine them properly; and Harris's specimen may have been an old one, and lost a tooth on each side. The Society's specimen was of a middle age, rather young perhaps than otherwise: the bones of the skull being well knit together, though not fixed by bony union.

It is greatly to be wished, that some friend to the Society would present another specimen.

VII.—*Analysis of Copper Ore from Nellore; with notice of the Copper Mines at Ajmír and Singhána.* By James Prinsep, *Sec. &c.*

Through the kindness of Mr. C. A. Kerr, I have had a further opportunity of examining the produce of the Nellore copper mines, of which cabinet specimens were presented to the Asiatic Society two years ago*, before the formation of the "*Indian Copper Mining Company*" at Madras, for the purpose of turning to profit the mineral stores of this promising district.

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* See Proceedings of the Asiatic Society, Feb. 1833, in vol. ii. p. 95.

From a pamphlet published at Madras, we learn that the copper mines in the Nellore and Cuddapah districts were discovered about 40 years ago, by Mr. Benjamin Hayne, whose report to Government, inserted in his *Tracts on India,* gives the fullest and most satisfactory account of them. From this pamphlet, we glean the following particulars of the locality, and of the quality of the ore.

"The districts on the coast in which copper ores have been discovered are those of the Calastry and Vencatagherry zemindaries, and the Udygherry Jaghire, in the zillahs of Nellore and Duppaud, and other places in the ceded districts.

"The principal mining places are at the distance of about 30 miles N. W. from Nellore, 30 miles from the sea, about the latitude of Rámapatam, and about 40 miles N. E. from Cuddapah.

"Several rivers run right through it on their way to the sea from the western hills, of which the Pillapeyroo, Vuppovagoo, and Manyroo form a junction not far from Guramanypenta, the principal mining place, and form a pretty large river, which is said to have a good deal of water throughout the year. Its beds are very stony, which seems in the eyes of the natives the greatest objection against its being made navigable for boats: it deserves therefore an accurate survey.

"The general aspect of the country is barren, and uncomfortable in the extreme: large trees are only found in and near the villages; and on the wide extended plains, on both sides of the river, nothing encounters the eye, but here and there a small thorny shrub. The grass, which, in the rainy season, every where else carpets the country with a refreshing green, is here both scanty and of the poorest kind, a species of "aristida," which, as the name implies, is a compound of long beards or bristles. This is the case in most mining countries; the surface of the soil contains in many places so much salt, that the inhabitants could make enough, if allowed to do so, for their own consumption.

"To the eastward, the country is open; only here and there a few low hills are to be seen; but to the westward, there are ranges of hills, the nearest at the distance of about 10 miles. Due west is one called Malla-coudah, from being the highest hill in the range. It is said to abound with wood. The Udygherry mountains are to the south-west, about 16 miles, and the highest in this part of the country: the highest point I take to be about 3000 feet above the level of the low country: I have seen myself, that plenty and large wood grows there, particularly between the valleys.

"About 20 miles on the way to the sea, in the direction of Rámapatam, are extensive jungles, consisting of—1. Korra, *Panicum italicum, L.* 2. Aruga, *Paspalum tomentacium, L.* 3. Woolava, *Glycene tomentosa, L.*

"This country is, geologically speaking, of a primitive description; the general rock formation is a mica-slate, of different colors and consistence. It shews itself first in the low country, at the distance of about 15 miles east from the hills; it forms sloping mountains, which are often capped with horn-stone slate, which passes into sand-stone, and on the other hand, into jasper. The tabular summits and mural precipices of the Udygherry hills consist of the latter stone kind: the layers or strata of the mica-slate occur in different positions, and inclination to the horizon; often in the low country forming a right angle with it; on and about the Udygherry hills, the strata appear in the utmost confusion, as if thrust by force out of their proper position. Traces of copper ores are often found in this rock, and it is generally known to contain various metallic veins, as gold, silver, and copper.

"Subordinate to the former is green-stone slate, in mighty layers, often as to appearance constituting the principal rock of a district for many miles. This is the case about Guramanypenta and the other mining places. The layers or stratification of the latter rock I have as yet always found in a horizontal position.

"The green-stone slate is often approaching to green-stone; it occurs then only obscurely slaty, has a jet black color, strong glossy lustre, foliated fracture, hard in a small degree; in this state it seems here barren of metals of any kind. The real green-stone slate is of a bluish black color, with small white spots of decomposed felspar, half hard; and when exposed to the air, it crumbles soon to pieces, and takes a green color. The rock is reckoned one of the richest '*mothers of ores*' of any in the world. In it are found silver and copper in rich beds or layers, as is the case here; but never in veins, as in other formations*.

"The layers of copper are of different thickness, and distances from each other: the general run of the pieces of ore, constituting the layers, is two inches in thickness; but they have been found also of several feet. The pieces are in general flat, as if compressed, and coated with ochre. The vertical distance between the layers is 4 to 8 feet, and the horizontal is even more uncertain.

"A corroded honey-combed quartz is found in great abundance in the green-stone slate, particularly along with the copper ore. It appears often on the surface, in such places where the water has washed the earth away. It looks then like indurated marl, which in other parts of the country is very common.

"The rock† is covered with a red coarse gravel, which is the superficial soil of this part of the country. In my opinion, this is formed from the decomposition of the green-stone slate, and its quartzoze and ferruginous contents; for copper ore is often found in it in considerable quantity, and in the same situation, as in the slate rock.

"At Yerrapillay, in a new mine, which I opened, I found two layers of ore in it, at distances of four feet asunder.

"The thickness of this stratum of gravel differs according to its situation, whether it is on a high or low ground. I have found it from 4 to 6 feet, and more.

"The copper ore which Dr. THOMSON calls Anhydrous, the most common kind, is in flat pieces, externally, of a brown ochry color; internally, of a black iron color, which often passes into green; when moistened with water, it becomes almost immediately throughout green; in some places, it is bluish grey throughout. Lustre, in some places, where it is black, semi-metallic; and in the bluish grey, metallic‡. The copper indeed is in an almost metallic state in it. Fracture approaching to even fine grained streak; of the black, brighter metallic; powder, "*greenish;*" not very hard, except the iron black and bluish grey part; which is with difficulty scratched by quartz; brittle; not particularly heavy. Specific gravity, 3.09. Some pieces are found of a nut brown color, and some with conchoidal fracture. The foreign admixtures are various, as white and green quartz, mica, iron ore; mountain blue and malachite are in some places found with it. In other places, I suspect the admixture of silver. For the analysis, I must refer to that of Dr. Thomson, in a paper laid before the Royal Society of London, which I was permitted to publish as an appendix to my "*Tracts on India.*" I will only mention here, that on an average, he procured 50 per cent. of pure copper. In the dry way, or by simply smelting the ore, we have received the metal in *greater proportion,* which may be easily accounted for by the quantity of iron, which the ore contains, that cannot be separated, as when the analysis is carried on by acids and other re-agents."

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* One of my specimens from Nellore is abundantly curious and interesting. It consists of distinct layers of the carbonate, alternating with black micaceous schist, or rather green-stone, affording exactly the appearance of gradual deposition from a liquid at this earliest period of geological formations. The angle formed by the strata of this striated rock with the horizon is stated by Mr. KERR to be about 45°.—J. P.

† See Dr. BENZA'S observations on veins of quartz pervading decomposed pegmatite, J. A. S. iv. 421.—ED.

‡ This description accords so completely with that of No. 3, in the subjoined analysis, that I have no doubt Dr. HAYNE has mistaken the sulphuret for Dr. THOMSON'S ore.—J. P.

Mr. Hayne seems to have been wrong in imagining, that the natives had only discovered these mines 50 or 60 years before (about 1750). Mr. Kerr, who has since visited the whole of the mining district, and examined all the formations, and the old works, with great care, states, that the former excavations are of prodigious magnitude, many of them occupying several hundred feet square, and having a depth of 50 or 60 feet. The matrix rock and rubbish are now accumulated in these immense tanks; but on clearing them away, the mouths of the galleries extending into the rocks were discovered; blocks of the ore, (perhaps some that had been gathered previous to the discontinuance of working the mines from some political convulsion or oppression,) have been used to mend the village tank at *Guramanypenta;* and Mr. Kerr imagines, that any quantity of the richest ore* may be obtained at a trifling expence, and within 100 feet of the surface. Extensive hills, formed of lumps of ferruginous slag, now covered with vegetation, point out the situation of the ancient smelting houses. A piece of this slag (which was at first mistaken for a volcanic product) was analysed by myself. It yielded but faint traces of copper, shewing that the native processes of extraction, however rude, were effectual in completely separating the metal. But I must now proceed to observe upon the actual specimens of the ore submitted to my examination, purposely avoiding all allusion to the mercantile value of the mines, the estimates of the expence of working them, and the invitations to join in an association for this purpose:—objects which are highly interesting to the community, connected with so laudable a measure for developing the natural riches of the country; but which cannot with propriety be entered upon in a work devoted exclusively to literature and science.

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* The "steel-grained, crystallized silvery ore, invariably found in green-stone slate, and partly imbedded in quartz, the richest ore met with," is doubtless No. 3, the sulphuret.—J. P.

The ores now presented to me are from three different localities. They differ considerably in quality one from the other, and all from the former ore, which Dr. Thomson pronounced to be an anhydrous carbonate, new to mineralogy.

No. 1. A parcel, weighing 90 lbs. of roughly-picked and cleaned ore, has a quartzose matrix, in some parts colored green, or appearing so from the malachite beneath the transparent crystal. It contains much iron, which, on solution in an acid, appears in the form of a yellow ochre. Ten per cent. of quartz was separated from this specimen on pounding it roughly, before setting it apart for analysis.

No. 2. A parcel of the same weight is labelled "*Bungeral Mettah,*" and is the species stated to be found in clustered nodules in the alluvium, of rounded exterior, as though they had been detached from their original site, and reburied here. The ferruginous matrix of this ore, on solution, assumes the appearance of a dark-red oxide. It is the same probably as that of Dr. Thomson's specimen. The carbonate of copper runs through it in veins, but the mixture of sulphuret of iron and perhaps of copper with the oxide, gives the whole a dark arenaceous texture.

No. 3. The richest ore of the three is at the same time the most abundant, and promises to yield the safest return, as it runs in unbroken veins. This ore is a combination of carbonate and sulphuret, the former intermixed with the latter, but readily distinguishable from it, as the sulphuret is crystallized, and has the grey metallic lustre of galena. The specific gravity of this ore is 3·77, being intermediate between that of the carbonate, 3·2, and the sulphuret, 4·5.

The analysis was conducted for the sake of expedition on separate parcels of 100 grains each, in lieu of attempting the separation of the ingredients from a single parcel. Some variation may thus be induced from the irregularity of the ore; but, on the whole, the results ought to be more trust-worthy. Thus: the carbonic acid was estimated by the loss of weight on digesting 100 grains, finely pounded, in dilute nitric acid. The water, (for none of these ores was found to be anhydrous,) by heating in a glass tube, removing the aqueous vapour by bibulous paper, and ascertaining the loss. As the ore generally lost its green colour by this operation, it is possible that a portion of carbonic acid was also driven off. Calcination in an open dish, in the muffle of an assay furnace, gave a loss, which was compounded of that of the carbonic acid and the water. Calcination drives off the sulphur also, but the equivalent of oxygen, which replaces it, being of precisely equal weight, this operation affords no test of the quantity of sulphur present.—In fact, not expecting from Dr. Thomson's analysis, to find sulphur in the Nellore copper ore, I at first neglected the precautions necessary for its separation. This was accordingly effected on other samples, by boiling in strong nitric acid, which, from its heat, caused part of the sulphur in a pure state to rise in fused globules to the surface : while a portion, being oxygenated, was afterwards separated by precipitation with barytes.

The quantity of copper was most conveniently estimated from the black oxide taken up from the calx by dilute nitric acid. It was also obtained directly from other samples by reduction of the oxide with charcoal and borax.—The iron and pyrites were deduced from the difference between the residue in the cold solution, and that from the hot dissolution in strong acid of another parcel, before calcination.

Collecting together the results of the above operations, we have the following data, whence to deduce the composition of the three specimens.

		No. 1.	*No.* 2.	*No.* 3.
a.	Loss of carbonic acid by digestion in dilute nitric acid, ...	12.0	14.6	7.0
b.	Loss of water (and some carb. acid ?) by heating without air in a glass tube,..................	5.0	7.0	3.0
c.	Total loss on calcination with access of air, ...	17.5	17.8	21.0
c 2.	Ditto average of two other trials (more carbonate,)	20.0	20.3	23.5
d.	Oxide of copper taken up from calx *c* by dilute acid,	37.7	49.2	73.7
e.	Residue of insoluble earths and ox. iron, after *d*,	44.8	33.0	5.3*
f.	Residue from digestion of crude ore in boiling nitric acid, ...	20.0	13.9	19.0
g.	The same, after burning off the sulphur and redigesting in do.	20.0 ?	8.5	0.0
h.	Sulphur, separated on boiling in strong acid, ...	0.6	2.1	9.0
i.	Sulphate of barytes precipitated afterwards, ...	1.4	17.8	28.5
k.	Weight of metallic copper actually recovered from *c* 2,	28.5	52.2	59.0

In regard to *d*, No. 3, it was observed on digestion in cold nitric acid, that a very considerable portion of the calx of copper was of a red color, or in the state of protoxide, or perhaps in a metallic state, and was not taken up without disengagement of nitrous gas ;—the weight 73.7 must therefore be increased, to give the true weight in terms of the peroxide. This is also proved by the amount of loss in *c*, 21.0, which is considerably in excess ; and it was remarked on removing the calx from the fire that it was agglutinated, so as perhaps to have prevented the access of air to oxidate the interior.—The sulphur enables us to approximate the correction of this item; for 12.8 requires 51.5 copper, = 64.3 black or peroxide; and this, added to 22.8, the peroxide of the carbonate, would give 87.7; which is 14.0 greater than the actual return from the fire.—Again, deducting the deficiency after calcination *(c.)* 21.0, from the sum of the three volatile ingredients—sulphur, 12.8; carbonic acid, 7.0; and water 3.0 = 22.8, there remains but 1.8 for the weight of oxygen absorbed in place of the sulphur; whereas 12.8 are required.—Adding the difference 11.0 to *d*, we shall have 84.7. This number will be found to be a little in defect from the subsequent results; while 87.7 is a little too great; a mean may therefore be adopted.

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* This residue may have consisted partly of sulphuret of copper that had escaped decomposition in the fire ; for another specimen was wholly soluble, and little iron was present in the solution.

From the above data, we may now proceed to extract the simple elements of each specimen of ore:

	No. 1.	*No.* 2.	*No.* 3.
l. Metallic copper, calculated from the oxide *d*, ...	30.2	39.5	69.0
m. Pure sulphur, from *h* and *i*, ...	0.8	4.5	12.8
n. Carbonic acid, less $\frac{1}{10}$th for hygrometric moisture,..	10.8	13.1	6.3

The carbonic acid being supposed to be wholly combined with copper, while the sulphur may be partly united with iron, we may calculate the proportions of the carbonates and sulphurets by means of the scale of chemical equivalents, thus:

	No. 1.	*No.* 2.	*No.* 3.
o. The carbonic acid will require copper, ...	31·4	38·6	18·3

Now in the first two of these, the copper required so nearly agrees with the calculated weight of metal, *l*, that the latter may be looked upon as existing here wholly in the form of carbonate, and the sulphur as united entirely with iron*. In No. 3, however, we find that the majority of the copper remains; and knowing the nearly total absence of iron in this specimen, we may conclude it to be a mixture of nearly two parts sulphuret, with one of carbonate.

The miner would rest content with the determination of the pure metal in the ore, and would have good reason to be satisfied with the 60 per cent. "actual yield" of No. 3, or even with the 30 per cent. of the poorest of the three ores; but the mineralogist will prefer an exhibition of the component salts of the ores, according to the usual synthetical formula. I may here remark, that the water separated (*b*) is more than is required to convert the carbonate into a hydrate or ordinary malachite: thus,

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* In the second Analysis of No. 2, however, the copper actually recovered, *k*, so much exceeds this quantity, that it is evident this ore frequently contains sulphuret, or is of very variable quality.

		No. 1.	*No.* 2.	*No.* 3.
p.	The copper combined with carbonic acid being, ..	30·2	39·5	18·3
q.	will require water to hydrate it, ...	4·2	5·5	2·6

The excess in *b* may have been carbonic acid, partially driven off.

The chemical composition of the three minerals may therefore be thus expressed:

	No. 1.	*No.* 2.	*No.* 3.
Hydrated carbonate of copper, ...	52·4	68·5	31·7
Sulphuret of copper, ...	0·	0· ?	63·0
Sulphuret of iron, ...	2·1	12·4	0·0
Oxide of iron, silex, &c..........................	43·5	25·1	5·3
Loss or excess, ...	2·0	—6·0	0·0
	100·0	100·0	100·0

The excess in No. 2, is doubtless owing to the irregularity of the rocky admixture in different specimens, whereof one yielded 44, and another only 13·9 of insoluble matter, on digestion in acid.

The richness of the last of the three minerals will more than compensate for the increase of trouble and expence in the reduction of the ore by successive roastings; and practical miners assert, that the glance or grey sulphuret is a much steadier and more plentiful ore than the carbonate.

I should add, before concluding the above imperfect analysis of the Nellore copper ores, that I tested them in vain for silver and other metals. Neither did arsenic appear to be present.

I may here mention, that among the specimens of minerals presented to me by Mr. Kerr, as occurring within the copper mining district, associated with the micaceous schist, are the following; corundum and adamantine spar, garnets, dark-green actinolite, red chalk, manganese; besides carbonate of magnesia, and other minerals of which specimens have not yet reached me. An ore of mercury is also suspected to exist in the same range of rocks. The surface of the gneiss or micaceous schist, where exposed to the air, is frequently seen tinged of a green colour, from the trickling of water holding carbonate of copper in solution, through crevices of the rock.

Copper Mines of Singhána, in the Shekáwatí country.

I take this opportunity of acknowledging the receipt of further specimens of the ores of these mines from Colonel Stacy.—They consist of the yellow and grey sulphurets, carbonates, and the blue native sulphate in deliquescent crystals. The latter is probably produced from the pyrites; as is the sulphate of iron from its sulphuret. Both of these occur also at Singhána: the sulphate, from its different tints, having the native names of *píla* and *hara kasís*, or yellow and green vitriol. There is also among the specimens a *mungya* *kasís,* which appears to be a compound of alum, and the sulphates of iron, and copper. There are two very beautiful specimens of virgin copper in mammellated concretions, coating oxide of iron, which appear to have been formed by a natural decomposition of the blue soluble sulphate on coming in contact with the iron ore.

A full description of the Singhána mines, and the mode of extracting and working up the ore, (by Captain Boileau, of the Engineers ?) is printed in the third volume of the Gleanings in Science, page 380. It does not appear from that notice, that any previous roasting of the ore is resorted to ; but instead of this process, the ore is ground to a fine powder, formed into cakes with cow-dung, then burnt in a " clamp," and lastly, mixed with scoria of iron to be blasted. The iron in this operation, deoxidated by the charcoal, doubtless assists in removing the sulphur from the copper by its superior affinity. The metal produced from these mines is, however, not thoroughly refined ; but according to Captain Boileau, is brittle, and of a lilac colour : while that of *Basáwar* in the *Bhartpur* district, (most probably a carbonate) is at once melted down into a fine malleable metal—but on the other hand, the latter is too poor an ore to be worked profitably.

The extent to which the *Shekáwatí* mines have been worked in former ages of Hindu prosperity is fully equal to that we have seen of the *Nellore* mines, and strikingly similar in every respect. "The scoriæ, or *khangar*, that have been accumulating for ages, have at length formed a line of small hills, several hundred feet in length, and from thirty to sixty feet high : there are four insulated stone bastions built on ore of these artificial mounds. The rocky ridge in which the excavations have been carried on for generations is pierced by numerous shafts, giving access to the galleries, by which the hills are honey-combed in every direction to the length of a *kos,* if the natives are to be believed." But I must refer to the article whence these paragraphs are quoted ; for the whole account will be read with interest.

I am in expectation of further specimens of the *Shekáwatí* minerals from Mr. Dean.

Ajmír Copper Mines.

A new locality of copper ore has recently been brought to notice by Captain C. J. Dixon, in the neighbourhood of *Ajmír*, where three different shafts have been opened. Specimens of the ore extracted thence were forwarded to me by the present Governor General, along with a copy of the report from Captain Dixon, on the subject, dated 8th May, 1835, from which I extract the following particulars :

"The *Ajmír* ore in mineralogical phraseology is 'termed a ferrugenous red oxide of copper,' and being free from sulphur, two operations are sufficient to metallize it; one smelting, and one refining. The ore in *Shekáwatí*, as well as the principal ores worked in Cornwall and Wales, are sulphurets, copper pyrites. They require successive calcinations, roastings, and smeltings; eight separate processes being essential to perfect metalisation. At the same time, that our operations are conducted with celerity, and consequently at a comparatively small outlay; inasmuch, that the ore, on the third day after it has been dug from the vein, is reduced to a metallic state, adapted for sale; (while in Europe calcination alone occupies several months,) the business of smelting is wholly free from that noisomeness, so injurious to health, which characterises works of this nature at home, when sulphur forms an ingredient in the chemical composition of the ore.

"The first vein was opened near *Gúgra*, four miles N. N. East of *Ajmír*. It runs north and south, and its breadth varies from a span to four inches. It is situated on the plain, within one hundred and fifty yards from the range of hills; its greatest depth being sixty feet from the surface. An admixture of ores from separate veins is essential to a complete fusion; and with this intention, a vein was sought and opened at *Rájgarh*, twelve miles S. S. West of this. This vein, also on the plain, but near the hills, is only twenty-five feet from the surface, while a third has been opened, within the last fifteen days, near *Rajáurí*, ten miles south of *Ajmír*. The presence of copper has been detected at other spots: indeed, it is beyond doubt the whole of the *Ajmír* valley is traversed by veins, which run from *Kishengarh* to *Rájgarh*, a distance of thirty miles; industry and capital being the sole requisite to their complete development. In Cornwall, good veins are not met with, until attaining a depth of three hundred feet and upwards. At present, our labours are confined almost to the surface. The transmission of these specimens will, I hope, prove so far useful, that should the Honorable the Governor General be pleased to make them over for analyzation to some scientific gentleman in Calcutta, their intrinsic value as ores will be ascertained; for though the studies of the laboratory be as widely different in their issues from the labors of the furnace, as theory is from practice, still a favorable result in the former will be highly satisfactory, and may at a future period warrant the establishment of the works on a large scale. In exemplification of the observation in reference to theory and practice, various specimens treated in the study yield from twenty to eighty per cent., while the average produce of the mines in Cornwall for some years past has ranged from eight and a quarter to ten per cent. of metal. The reason is obvious. In the small way, assorted specimens are selected, and by proper care and attention to their treatment, every particle of metal is recovered. But in the large way, in the smelting furnace, rich and poor ores with a good deal of extraneous matter incorporated therewith are fused together. Hence the result of the furnace always falls short of the issue of experiments in the study."

Captain Dixon is quite correct as to the fallacy of trusting to the results of the laboratory in regard to the average produce of mining operations. The nature of the ore, and of its associated minerals, is all that the chemist can pronounce upon. In this respect, the *Ajmír* ores, like those of *Bhartpur*, hardly offer much encouragement: none of the specimens, small as they are, consist of homogeneous ore, but are in general, merely coatings of carbonate on a ferruginous matrix, or veins in quartz and a micaceous schist. It is probable, however, that small cabinet specimens would be selected for this very object of shewing the connection with other rocks, and that far richer lumps are taken to the smelting house.

The ore from *Rájgarh,* twelve miles S. S. W. of *Ajmír*, is accompanied with slender prismatic crystals of selenite, of black augite, hydrated red oxide of iron, and carbonate of the same metal. There are also veins of an aluminous or silicious malachite, which may be termed *turquoise copper ore ;* it is of a fine blue colour, translucent where thin, breaking with conchoidal fracture, and apparently capable of being converted to ornamental uses. It differs from the turquoise*, in being insoluble in acids, which take up only the green colouring matter, a carbonate of copper. I have not further analysed this curious mineral. At *Rájauri,* ten miles S. W. of *Ajmír*, the carbonate is of a lighter colour, more earthy, and accompanied with small yellow scales of mica and iron. At *Gúgra,* four miles N. N. E. of *Ajmír,* the malachite is associated with carbonate of lead, a micaceous carbonate of iron, and with a rich galena or sulphuret of lead. Yellow copper pyrites also shews itself, and earthy veins of a pale blue, very similar to some of the streaks in the turquoise rocks of Nishapur, in Persia. It is possible that this mineral itself might be met with, on farther search, if felspar or other aluminous minerals exist in the *Ajmír* hills : the matrix of the turquoise is also a red iron clay ore, very similar to that of the copper mines.

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* See analysis of this mineral in the *Gleanings in Science,* ii. 375.